Campaign to Protect Rural England
Standing up for your countryside

New model farming: resilience through diversity

FOOD & FARMING FORESIGHT – Paper 1

FOOD AND FARMING FORESIGHT

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Campaign to Protect Rural England: Food and Farming Foresight Series

The objective of the Campaign to Protect Rural England Food and Farming Foresight Series is to provide evidence-based research papers that support innovative policy solutions to critical food and farming issues.

The purpose of the series is not to set out CPRE's official policy position on the future shape of the food and farming system. Rather, it is to explore 'blue-sky' policy solutions and provoke wide-ranging discussion on the future shape of food and farming.

Over two years, we plan to release a series of research papers that examine different aspects of the food and farming system. The series begins at a time, following the EU referendum decision, when there is an opportunity for major policy change. The Government will need to work with a wide range of organisations to comprehensively review the legacy of farming policy within the EU and to develop a new vision and policies to establish a sound future for farming.

With this in mind, we welcome comment on the policy recommendations within the Food and Farming Foresight Series as well as suggestions on subjects for future papers.

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Food and Farming Foresight Series Papers to date:

1. New model farming: resilience through diversity

FOOD AND FARMING FORESIGHT

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Researched and written by Graeme Willis.
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Summary

The importance of farming

The importance of farming cannot be overstated. It is the main user of land in England, and the valued and varied patchwork of landscapes, our countryside, has been created over millennia of farming interacting with nature, feeding us in body, mind and spirit.

With good stewardship, the land maintains the quality of water, cuts flood risk and protects the landscape and wildlife. Farming, which uses around 70% of all land in England, produces food and much else besides. In a compact, densely populated country, we need to farm for multiple purposes and need farming to be appreciated this way.

Most policy affecting farming has come from the European Union (EU), with the Common Agricultural Policy (CAP) dominant since we joined in 1973. It is a product of compromise across 28 member states, serious in intent but complex to apply and difficult to alter. Brexit gives us the first opportunity in decades to better match policy and public funds to urgent farming issues in England – now we can shape a new national vision and policies for farming. This paper aims to contribute to the wider discussion needed to develop that vision, and suggests policies to build a resilient, financially stable and dynamic farming industry that works for communities and the environment.

The economics of farming will be a major factor in any new policy framework. Farmers are currently paid directly via the CAP for the land they farm. The billions of pounds of public money involved make this a critical issue for farmers' livelihoods and for public accountability in an age of austerity. Without these sums, roughly half of farming is uneconomic. Volatile markets and low prices at the farm gate make profitable farming highly challenging, so any new settlement must enable farming to be efficient, resilient and able to invest for the future. But it must also ensure farming delivers what is in the public's interest – not just more food.

In the push to secure the supply of food after the Second World War, policy supported the industrialisation of farming. The use of chemicals became the norm in 'conventional' farming practice, enabling spectacular gains in yields; machinery improved the efficiency of labour. But the environment we depend on – the natural assets of wildlife, ecosystems in water and soils, and landscapes – has suffered and in many places continues to decline. Climate change presents challenges and a new imperative. Farming must find a new balance with nature to reduce the risks – and costs – to itself and to us, and to restore the health, abundance and variety of the natural environment.

Farming has long been part of the beating heart of rural life, strongly connected to the communities and character of the countryside, and still enjoys warm – somewhat nostalgic – public support. But on many farms, industrialisation has removed livestock from fields, turned varied landscapes into vast monocultures and is stripping away the abundance of natural life from the soil and countryside. Farms, farmers and workers have gone, too, and those that are left are more isolated. Fewer people have any real link to – or understanding of – farming, and the potential to build public understanding of nature and landscape is being undermined by the direction of travel of our farming and food industries. Something needs to change to make our food less anonymous, without connection to seasons, plot or place. We need new farms and farmers, starting with horticulture, connected to communities and selling locally to them. We need greater diversity in fields and on farms, with crops, livestock and nature in better balance. Together with a more open industry, this would go some way to restore our connection to nature, which, if not entirely lost, is being slowly extinguished.

Key policy recommendations

This report identifies a range of policy changes needed for the Government to increase the diversity, sustainability and resilience of the farming sector on which so much of our countryside depends.

1. Land availability

Increase the availability of land for new farmers and growers through a package of measures such as transparency in land ownership, new incentives for landowners to release land and changes to land-use planning to deliver allotments, community right-to-grow plots and smallholdings. The role of county farms should be reviewed with a view to reinvigorating the estate and its role as an incubator of new producers.

2. Funding

Secure the long-term financial stability of farming by ensuring public funding continues but is progressive and publicly accountable. Direct funding should provide a safety net for all farmers and growers, with targeted help for new entrants and to aid succession between generations.

3. Supply chains

Work with businesses across the supply chain to create market conditions that support multi-purpose farming, including affordable food and equitable trading. A range of measures, such as transparent labelling, retailers improving their ranges of goods to support higher standards (choice editing), support for new forms of retail, and better regulation, should be considered.

4. Sustainability

Build the resilience of farming to reduce its risk from climate change and make its management of natural assets sustainable by targeting most public funding to delivering public benefits and address market failures. 'Green' farming should be supported by strong incentives, rewards for outcomes and a more collaborative approach. New more sophisticated ways to measure, monitor and reward farming success need to be developed through metrics which take into account the wider impact of farming on natural assets, such as pollution of water and carbon storage in soils.

5. Innovation

Improve innovation and resilience across farming at all scales by supporting farmer-led development and promotion of techniques and application of appropriate technologies. A new national programme of farmer field schools would help to develop and spread methods to cut risks, boost productivity and net income as well as restoring nature. Agri-tech initiatives should include smaller-scale technologies for a range of farm sizes.

Farming beyond food

This paper looks at how farming is struggling to succeed economically, to protect the natural environment and to define its relationship with the public it feeds. It examines barriers to change, and recommends ways that policy could help create and support a farming sector that is more diverse, dynamic and innovative, that can address environmental and financial challenges and be the steward of the countryside we need it to be.

1.1 | Farming for multiple purposes

Farming is not an ordinary industry: as well as its economic value it fulfils a variety of functions. Nevertheless, it generates some £9 billion each year from food directly and provides raw materials for our biggest manufacturing industry – the food and drink sector – which is worth nearly £100 billion to the economy.[1] Add in tourism linked to the attractiveness of many of our farmed landscapes, and the economic contribution is vast.

Farming is vital to communities, to public health and well-being. It provides a secure supply of food: some three-quarters of what we need that can be produced in our climate. With sufficient care we could be almost self-sufficient.[2] Vital, too, is the green space it provides for recreation, recuperation and inspiration. Farming has shaped the countryside and landscapes people enjoy, and continuity in farming protects them. Farms and farmers are also at the core of rural life, physically rooted when much around is shifting, and adding local distinctiveness through how and for what the land is farmed and via buildings and features such as hedgerows, walls and ponds.

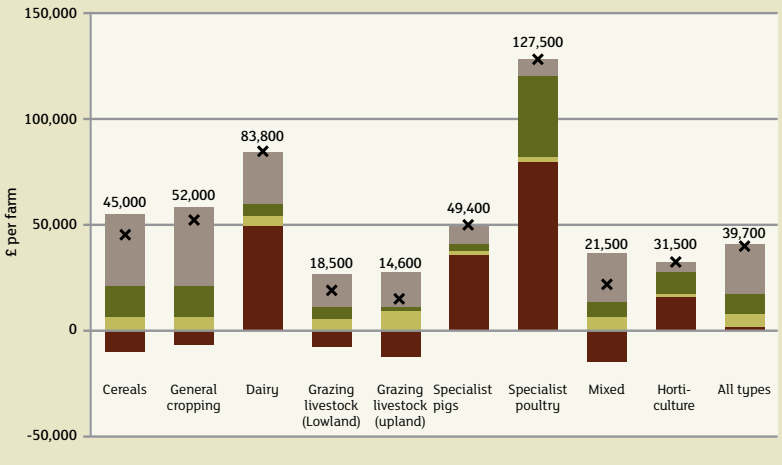
Farming alters the wider natural environment – air, water and soil. It has long worked in balance with nature and nature has evolved to exploit semi-natural habitats created by farming. Many species depend on farming, as does much else: land and soils are key to the replenishment, filtration and retention of water, recycling of nutrients and the storage of vast quantities of carbon. Increasingly, too, rural land generates renewable energy via anaerobic digestion, producing fuel from plants, and solar and wind farms.

England is a small country with a growing population and increasing demands on land to support economic growth. The farmed land we rely on is a diminishing resource as it is lost to development or degraded – both here and abroad. We have relied for centuries on imports for a reliable food supply, but this is becoming a less secure option. So, there is an imperative to make the best use of the land in England, the bulk of it for food. Farming must continue to feed us, but also to provide good landscape, clean water, healthy carbon-rich soils, thriving ecosystems and abundant wildlife. The future of farming in this country has to be multi-purpose, but the industry – and policy makers – have yet to take this fully on board. It remains for the Government to develop the whole-picture strategy for farming that recognises these issues and develops an agenda for change.

KEY
- Single payment scheme
- Diversified income
- Agri-environment payments
- Agriculture
- × Farm business income

Source: www.gov.uk/government/uploads/system/uploads/attachment_data/file/471952/fbs-businessincome-statsnotice-29oct15.pdf Table 2 Figure 3
Figures may not add due to totals in rounding.

Figure 1 | Farm Business Income by Farm Type and Cost Centre 2014/2015 (£/farm)



1.2 | A changed policy world for farming

Farming policy has largely been shaped by the CAP since the UK joined the Common Market on 1 January 1973. The CAP has evolved from generating high production surpluses to introducing environmental measures in the late 1980s. In the 2000s, payments for production changed to an area-farmed basis. The CAP has imposed relatively complex management requirements on land managers in exchange for public funding. It has also limited the scope of policy development within the UK. The Government, too, has appeared resistant, unambitious or slow in taking up initiatives that some other EU partners have benefited from, such as agroforestry or using protected names to support quality.[3] The EU referendum decision opens a new chapter in farming policy for England. For the first time in four decades, the Government will have the scope to develop a national farming

CASE STUDY **INNOVATION; SOILS; RESILIENCE; PROFITABILITY**

Agroforestry at Whitehall Farm, north west Cambridgeshire

Whitehall Farm is a 100 hectare farm owned by Cambridgeshire County Council and managed by Stephen Briggs on a 15-year tenancy, along with over 300 hectares of other land. The Whitehall fenland soils are of grade 1 quality and high in organic matter but prone to wind erosion. A Nuffield scholarship on soil inspired Stephen to take an innovative approach to protecting this vital asset while building the profitability, resilience and sustainability of the farm.

Stephen has introduced agroforestry or a 'silvo-arable' system to 50 hectares of the farm. In 2009, arable crops were interplanted with apple trees – a mixture of heritage and modern varieties for eating and juicing. This has had a range of benefits. First, the apples provide income and increase profitability. After five years, the annual apple yield has risen to 25 tonnes. Across the holding, total output is now equivalent to the previous system, but the apples earn more than the annual crops and the trees will grow to produce heavier crops. Next year, Stephen expects up to 40 tonnes. The addition of trees is a simple way to increase the farm's capacity by tapping into a longer growing season as well as adding another layer of crops – above those grown in the field.

Second, diversifying production is reducing the farm's exposure to fluctuating markets for cereals and cutting financial risk. Diversification should also protect the farm from the risk of extreme weather from climate change, drought or heavy rainfall events damaging growing crops. This is increasing resilience.

The lines of trees act as windbreaks, sheltering fragile fen soils from wind erosion, a severe risk in this area. As Stephen says: 'On a "fen blow day" you can literally see the soil disappearing over the ditch – there are no hedges here. I would rather keep our own soil than give it to my neighbour!' The trees also reduce water loss and extract minerals from deeper soils, which are fed to surface soils via leaf litter. Over the longer term, this should cut input costs.

Finally, a major beneficiary is wildlife. Lines of trees maximise the 'edge effect': much more of the crop is exposed to beneficial insects living in the tree lines, such as ground beetles which prey on slugs. The understorey also supports a pollinator wildflower mix to encourage other insects. Farmland birds are flourishing, with increases in the number of tree sparrows, reed buntings, yellowhammers, English partridge and owls: from none before the trees, the farm now has four nest boxes occupied by barn owls producing multiple broods.

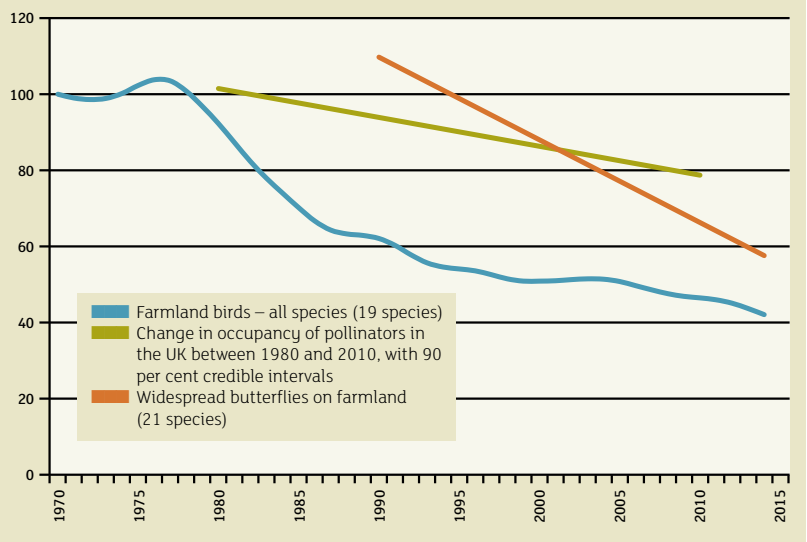
Challenges remain. Policy on agroforestry in England is stuck in an artificial divide between agriculture and forestry. Elsewhere in the UK and Europe, farmers are funded for planting trees among crops as part of rural development, but not in England. This is despite the biodiversity, carbon storage and water quality benefits of trees in farmland, as well as the added diversity in landscape. The relatively short tenancy agreement also prevents the planting of nut and timber trees. Stephen says: "If we want greener farming in the future with better productivity, restored natural capital and vibrant wildlife, we could hardly do better than fund agroforestry."

policy tailored to national conditions. But there will be constraints – not least, the nature of the trading relationship we establish with the EU and world partners that will affect tariff levels on UK imports and exports of food. The UK has some leverage here as we import much more food than we export. But, while we currently need to import EU fruit and vegetables, it is debatable whether other EU countries need our lamb or beef.[4] Critically, public funding of farming will be required at least for the medium term while farming adjusts to a new order. Public funds must address market failures for the foreseeable future to support the public benefits not currently rewarded fully, such as biodiversity, access and valued landscapes. But funding tied to policy should also encourage the sector to develop dynamism and innovation so that it can cope with future challenges.

Development of new farming policy for the UK in the context of our trading relationships will be a tough balancing act. It is essential that a new national agricultural policy puts farming on a sustainable and resilient footing. It needs to create an industry that produces food efficiently and is financially robust, but one that also stewards key natural resources and assets including soil, water, landscape and wildlife. In so doing, the new policy could lead on reversing damaging trends in farming in this country. The trade deals we negotiate will be critical for setting the rules for the wider market and ensuring the 'fairness' of competition. At a time when the UK could be seen to be turning in on itself, it has the opportunity to set an international example. Free trade will be a key objective, but there should be three additional objectives:

1. To support trade that does not drive further environmental damage elsewhere, including soil degradation, water stress, greenhouse gas (GHG) emissions and deforestation.

Figure 2 | Smoothed index of England Biodiversity Indicators*



**Source: Bat Conservation Trust, Royal Society for the Protection of Birds, British Trust for Ornithology, Department for Environment, Food and Rural Affairs, Joint Nature Conservation Committee From: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/492586/2015_England_biodiversity_indicators.ods*

2. To avoid rapidly cutting trade with developing countries that rely on it.

3. To avoid unfair competition which, through widely differing standards in other countries, undermines high standards of farming here.

1.3 | Farming is struggling economically

Many farmers make a loss from farming and, without public funding, would not earn an income. For instance, in 2014-2015 only the dairy, pigs, poultry and horticulture sectors earned income from farming alone, while the cereals and grazing livestock sectors made losses.[5] The financial position of farming is precarious. There are numerous factors involved, including:

- A de facto policy of cheap food.
- Increased volatility of market prices as more is traded globally.
- A recent fall in farm gate prices and decline over the longer term.[6]
- A fragmented farming industry lacking bargaining power when selling to a retail sector dominated by a few large players.
- A hitherto relatively high sterling exchange rate which disadvantages food exporters and reduces levels of payments to farmers set in euros.
- Higher standards of food production here than abroad, which can, without the right support, result in loss of market share to overseas producers.

These complex issues rarely get the political scrutiny they deserve. For example, regulation of the retail sector remains weak, with no ombudsman with the power to investigate or fine across the supply chain despite recognised unfair practices[7]; and the huge imbalance of trade, especially in food,[8] does not receive as much attention as the budget deficit. Failure to address such issues means we risk more farmers leaving the industry, with potentially worse outcomes if imports rise and more of our food production is taken overseas.

1.4 | Impacts beyond the economic

After the Second World War, policy was designed to boost production at a time of food rationing and was successful in this. The industrial farming that emerged is now conventional and prevalent, with heavier machinery, reliance on chemicals, and many fewer workers. Food supply went up but prices came down, and supermarket expansion and competition supported a 'de facto' cheap food policy. Serious damage to nature and the diverse character of the countryside was the result. Policy change in the 1980s brought new funding for green farming schemes, which have slowed or reversed some trends, but significant damage has yet to be repaired. This includes:

- A homogenised landscape as farmers have specialised – generally arable in the east and livestock in the west – and mixed farming has largely disappeared. Hedgerows no longer needed to retain animals have been removed (more than 200,000 miles between 1947 and 1990), creating bigger arable fields that can be farmed more 'efficiently'.
- The merging of farms, leaving fewer smallholdings and more part-time holdings and hobby farms; active farms have become larger, as have herd sizes,[9] and landscapes simpler as 'larger blocks of land are being managed with the same aim'.[10]
- The production of only one tenth of the fruit and just over half the vegetables we eat;[11] though figures have stabilised in recent years domestic production of fruit and vegetables has declined as imports have increased. More than half of our orchards were removed between 1980 and 2005 affecting the rural economy, its character and varieties of fruit grown.[12]
- A dramatic loss of wildlife such as species of farmland birds (an indicator of wider biodiversity), insects, particularly pollinators including butterflies and moths, and wildflowers.
- High use of synthetic fertilisers[13] and pesticides has displaced processes such as long rotation of crops, fallow land and animal manures common to mixed farming, allowing monocultures to dominate large areas of the countryside, including rye grass

replacing semi-natural grasslands. Monocultures or lack of diversity increase the risk of crop pest and disease spreading though a wider area and such risks will increase as temperatures rise. The increasing reliance on chemicals in farming has also contributed to water pollution, and only a third of waters in England are in good condition.[14]

- Use of ever-heavier machinery damages soils, and chemicals provide bursts of nutrients but do nothing for the structure, organic matter or biodiversity of soils. Soil damage from erosion, degradation and compaction is estimated to cost £1.2 billion a year.[15] The impact of a changing climate makes the condition of soils even more critical to future farming success.[16]

A half-century of focus on production has failed to put farming on a sustainable footing or underpin public health.

- Climate change: chemical farming is energy intensive and farming's GHG emissions are around a tenth of the national total. Since 1990, other industries have cut emissions twice as quickly on average and there is no clear plan for farming to make its fair share of the 57% cuts agreed by 2030.[17] This ignores the export of GHG emissions if imports of food and animal feed rise.

A half-century of focus on production has failed to put farming on a sustainable footing or underpin public health by making it easier to eat well. We eat too few fruits and vegetables yet national production has decreased and imports have risen.[18] An estimated 37% of land globally and 43% in the UK produces grain to feed animals relatively inefficiently rather than people directly,[19] and across the food chain we waste 15 million tonnes of food a year[20] – a third of all food bought – at an avoidable cost of £12.5 billion a year.[21] In effect, a third of all land farmed and all the resources needed to farm it – labour, energy, fertilisers – does not feed people but creates waste. Such figures make a nonsense of calls to produce yet more food without the corresponding effort to cut waste.[22]

1.5 | Lack of connection

Just over 6,000, or 10-11%, of all farm businesses are mixed, with numbers falling.[23] We now have fewer, more specialised and mechanised farms, larger holdings[24] and buildings, more intensive cropping and management of animals and far fewer people working the land.[25] The conventional image of farms as small and traditional, with a cheery array of pigs, sheep, cows and poultry, no longer reflects reality. The population has little real connection to farming or how food is produced. Few people work on the land[26] and many of those in rural areas commute to towns and cities. Nor do local farms usually feed local people. Most big supermarket chains use national and international supply chains. These can be long and complicated, as 'horsegate' – the horsemeat in ready

meals scandal – showed. Most supermarket shoppers are unlikely to meet a farmer or grower or someone who knows them.

In many ways, a lack of connection is not surprising. Britain was the first European nation to industrialise, with many people moving from the countryside to the burgeoning cities for better-paid work. We have been divorced from our food production for longer than many. Does this historic and continuing loss of connection matter?

It matters on several counts:

1. Farming has transformed. But if farms become larger still and operate more like factories, they risk undermining public appreciation of farmers as worthy of particular support. In short, the more farming resembles other industries, the less we are likely to care.

2. The farming industry bemoans public ignorance of where food comes from. Surveys show that some children do not know milk comes from cows or potatoes from the ground. People will understand little of fruit or vegetables if they do not see a variety of crops growing nearby. They will know even less of where meat or milk comes from if cattle – once a familiar sight in parts of lowland England – disappear from fields or live in sheds under no-grazing or zero-grazing systems.

Figure 3 | Number of commercial holdings and land areas, and dairy cow numbers in England*

Size band	Number of holdings (thousand)					
	2005	2010	2011	2012	2013	2014
Under 20 hectares	57.9	37.9	38.0	36.4	36.7	36.6
20 to under 50 hectares	26.3	22.2	21.4	21.4	20.8	20.7
50 to under 100 hectares	21.5	19.1	19.0	19.4	18.3	19.0
100 to under 200 hectares	16.4	15.4	15.5	15.7	15.7	15.6
200 hectares and over	10.4	10.8	10.9	10.9	11.3	11.1
Total	132.4	105.4	104.8	103.8	102.8	102.9
Average number of dairy cows on holdings with >=10 dairy cows	104	122	126	131	134	142

* From 2010 onwards figures relate to commercial holdings only. Results for 2005 are shown here on a comparable basis to show how crop areas and livestock numbers have changed over time. Commercial holdings are those with significant levels of farming activity. These significant levels are classified as any holding with more than 5 hectares of agricultural land, 1 hectare of orchards, 0.5 hectares of vegetables or 0.1 hectares of protected crops, or more than 10 cows, 50 pigs, 20 sheep, 20 goats or 1,000 poultry.

Source: Produced by Farming Statistics, Department for Environment, Food and Rural Affairs.
www.gov.uk/government/uploads/system/uploads/attachment_data/file/437952/structure-june-Englandsizebands-25jun15.xls

3. Conventional industrial farming – highly reliant on chemicals, machinery and fossil fuel energy – appears more divorced than ever from natural processes and even undermines them. It leaves fields starved of organic matter and biologically depleted, and strips away the healthy diverse and abundant natural life the countryside should support. Farming has huge potential to help the public understand the natural processes we rely on and to tell the story of how it shaped our varied and beautiful landscape. But where farming – and our food system – is heading, this potential is being diluted. Food is an easy way to discover nature and its processes, but we are in danger of denaturing it – and ourselves.

4. In countries such as France and Italy, there are many more small farms, and more families retain direct connections to the land and farming. It is probably no coincidence that farming there has greater political support and an appreciation of food is embedded in the culture and cuts across class and wealth.

Barriers to a stronger farming industry

This section explores some of the structural, policy and other barriers that make positive change towards a more diverse, multi-purpose farming sector more difficult.

2.1 | Flawed public funding for farming

The money paid to farmers under the CAP supports incomes but only a small proportion rewards farming for its sustainability or benefits to the public. Most money is paid to farmers directly – the basic farm payment – in proportion to the area of land they farm. This means the largest landowners are paid most: estimates suggest 80% of the payment goes to the 20% largest businesses.[27] Large farms of thousands of hectares in the east growing grain on productive soils receive large sums,[28] while small upland farms working difficult land in fragile landscapes receive much less. Smallholdings below five hectares are not even eligible.

We do not have a full picture of who owns what land in England because there is no complete, up-to-date and public register. Only 85% of land in England is on the public record.

By providing a return independent of market forces, a rent divorced from what the land produces, direct payment increases the market value of land. It makes it more expensive to buy and to rent. Direct payment boosts farmers' incomes even when crops make no profit at all, meaning that some of the money pays for the very agrichemicals – synthetic fertilisers and pesticides – that damage water quality and wildlife. The public pays for this twice because it also pays for the clean-up via water bills. In effect, the Government is making it cheaper to farm in ways that cause damage, which it then spends further money and effort elsewhere trying to prevent. The Government is aware of this – the Natural Capital Committee has called for an end to what it calls 'perverse subsidies' in farming.[29] Leaving the CAP presents an opportunity to end them.

A further perversity is that, for much of the life of the CAP, horticultural production has not been directly funded. Many small-scale fruit and vegetable producers have disappeared.[30] Those under 5 hectares are too small to be eligible for any support at all, despite the health benefits of fruit and vegetables and the national need to produce and eat more. But farmers growing sugar beet do get paid, despite the health impacts of sugar. Historically, one of the top UK recipients of the CAP payment has been sugar company Tate & Lyle (Europe).[31]

Moreover, most public support for farming – around 80-85% or some £2.3 billion in 2014 – is paid directly to farmers, with only around a third tied to limited 'greening' rules to ensure additional care of soils, biodiversity, water quality, wildlife and landscape. From 15 to 20% – or £502 million in 2014 – goes to farms that protect water bodies, safeguard soils, help wildlife thrive and maintain beautiful, healthy landscapes.[32]

2.2 | The characteristics of land ownership

Land ownership in the UK is the most concentrated in Europe, with a few institutions and wealthy individuals owning large tracts of England's farmland. Major landowners include the Royal Family and National Trust, as well as government agencies such as The Forestry Commission, Defence Estates and The Crown Estate . It was recently estimated that 36,000 people, or less than a thousandth of the population (0.07%)[33], own half of the land in rural England.[34] Around a third belongs to the aristocracy,[35] and in some cases ownership stretches back centuries from land gifted by the monarch.

Understanding and addressing ownership is difficult: we do not have a full picture of who owns what land in England because there is no complete, up-to-date and public register. Only 85% of land in England is on the public record.[36] Unless land is bought or sold, registration is not required. This means large historic holdings – such as those of Oxbridge colleges, where little may change hands in centuries – are not covered. Land can also be registered under nominal ownership rather than beneficial (the person benefiting from it), so that the real owner remains secret.[37] This lack of transparency contrasts strongly with the passion of the Department for Environment, Food & Rural Affairs (Defra) for data access to engage the public in

environmental issues. It also means local authority land holdings are often poorly recorded too. At best, the public has less information with which to try to influence use of public land; at worst, land, particularly if registered through companies based in international tax havens, can be used to launder money.

Another factor in the concentration of land ownership is the growing number of farms that absorb smaller holdings. With fewer small to medium-sized holdings, it is hard for those who are young or new to farming to farm in their own right or for others to move up the ladder as their experience and business grows. The loss of county council-owned farms has made matters worse. In the 1980s, they covered 340,000 acres, but 100,000 acres have since been sold and the number of tenancies halved.[38] Councils are struggling financially and the sell-off has continued. This raises serious questions about the long-term future of the county farm estate. Even council allotments, a low-cost way of growing food, are in short supply despite an upsurge of interest,[39] yet councils continue to allocate allotment sites for housing.

A further problem is that the price of farm land has risen dramatically, nearly tripling in the past decade.[40] Returns on investment in land – together with tax exemptions, particularly inheritance tax – have made it attractive for investors and fuelled further price rises. There is pressure, too, from the huge uplift in land value that comes from securing planning permission. Recent relaxation of planning controls has triggered more speculative applications. Holding on to land or acquiring it to then press for planning permission can be extremely lucrative.

The high capital costs of acquiring land can prevent people from a wide range of backgrounds from becoming farmers, thus depriving farming of potential dynamism and innovation. Many of the arguments

CASE STUDY **PASTURE-FED BEEF; SUSTAINABILITY; ADDING VALUE; FOOD ASSEMBLY**

The Grange Farm, north west Cheshire

The Grange is a 100 hectare grass-based livestock farm in the Green Belt east of Chester. The Rowlands family have farmed here since 1947. David Rowlands and son Huw now manage the farm, much of which covers lush low-lying land in the Gowy river basin.

Until 2002 the farm was a classic dairy operation with a 120 black and white Friesian cows, but falling milk revenues made change essential. As David puts it, farmers have the choice to expand the farm exponentially to produce commodities or to find a niche market and add value by moving up the food chain. There are two other choices: to leave farming before they go broke or to go broke.

The farm chose the niche route and gradually converted to a suckler herd of 50-60 cows, which now graze with their calves on the rich pastures and silage in winter. Red Polls, a native English rare breed from East Anglia, were brought in to replace the Friesians. They are well adapted to producing pasture-fed beef with excellent eating qualities. Through steady diversification and adding value the farm is now economically stable. This includes focusing on restoration of wildlife habitats and sustainable management of the land. The land is spread with composts from garden waste but no manufactured fertilisers.

The farm has a number of distinctive features. Around 30 hectares of land is peatland managed under Higher Level Stewardship (HLS), the top level of Government environmental funding. A variety of techniques encourage wildlife: lower stocking rates of Red Polls creates ideal conditions for water voles, amphibians and wading birds. Two hectares have been sown with plants to help pollinating insects such as bees, hoverflies and butterflies. This supports hives for honey sold locally. A further eight hectares are growing poplar trees to yield wood in time for carpentry. The farm is also one of only three livestock farms in the country accredited by LEAF, Linking Environment and Farming, for its sustainability and hosts visits for hundreds of people on LEAF's Open Farm Sunday in June each year. The HLS scheme also funded public access to the farm via two miles of permissive footpath well-used by local villagers.

A key to the farm's success is direct selling of their beef to a range of markets to reduce risk. The farm is developing a new farm shop and sells through a box scheme, local farmers markets and more unusually via a food assembly. This is a retail model from the continent where 750 assemblies already operate successfully. Customers order the exact products they want online to pick up weekly from a central location in Chester. This helps the farm to minimise its waste, sell a wide range of cuts and to meet and get feedback from their customers. As David says: 'I always tell my customers "I hope that you'll come back and tell me that you've enjoyed the meat, but, if you haven't do come back I and tell me because I need to know".'

for staying in the EU have stressed the value, indeed necessity, of a diverse, talented workforce for our science base, for research and development, and for the health, IT and financial sectors. Why are the benefits of diversity recognised in other sectors but rarely considered in farming? Farming may also miss out by failing to understand the needs of minority ethnic groups and the potential for new products that appeal to them. These groups comprise 14% of the UK population, a significant market and a potential source of new farmers and growers.

The range of issues analysed above suggest that access to land is a serious obstacle. This will continue unless the market can be freed up and we can develop new lower-cost ways for people to enter food growing and farming.

2.3 | Measuring what matters

How we measure farm performance matters: measures or metrics can influence farmers' goals and shape the policy, subsidies and penalties that affect them. Farming has to be viable, but we cannot assess farming success by economic outputs alone. We rely on farming to provide a secure supply of food, but also good water quality, landscape, habitats for wildlife and healthy soils. These other outputs of farming need to be measured, too. Currently, this is not done sufficiently by farmers or by the Government.

Another problem is how we measure economic success. The current Government has prioritised economic growth, including in its rural policy.[41] Growth can be a good or bad thing. More jobs are a social good, but economic activity can cause damage. However, the way we measure economic growth is not discriminating enough. The key measure is gross domestic product (GDP), which measures most economic activity, whether socially or environmentally useful or not. For example, disasters are generally good for GDP. In farming, even production of wasted food – currently around 35% – counts as economically useful, though it nourishes no one and represents the squandering of precious land, labour, fuel and animal lives.

A third problem is accounting for farming's complex relationship with the natural environment. Land is a key asset but farming also depends on natural processes such as soil activity, rain, sunshine and pollination. Other industries have to value their physical assets – vehicles, a production line or building – and reflect their deterioration or invest to upgrade or replace them. In farming, the condition of the land is rarely assessed or costed, so any damage to the soil or the natural processes it supports are not included in the calculations. This means bursts of production can increase income in the short term and register as economic growth. Arguably, this is a form of asset-stripping by oversight. Damage to long-term assets that are critical for high yields in the future and ensure that crops are resilient to drought or storms are, in accounting terms, ignored.

Productivity is often used as a measure of efficiency in farming and for comparing UK farming to that of other countries. The Government's preferred measure, Total Factor Productivity (TFP), normally measures all inputs (labour, capital, energy etc) and outputs (the value of direct production such as crops or meat). For farming this is a measure of 'how efficiently the agricultural industry uses the resources that are available to turn inputs into outputs'. TFP can go up if yields – or their market value – increase or if inputs are reduced. But, in farming, statistics consider land in area but not critical aspects affecting yields, such as soil depth or organic matter.[42] While lower or higher inputs of fertilisers may be a rough proxy for how soil is performing, TFP does not offer any meaningful information about how sustainably the land is being managed. Moreover, though TFP is a measure of efficiency, it does not tell us much about wastage levels of bought-in nutrients (nitrogen, phosphorous, potash etc) and the real-world costs associated with the damage they cause: another – uncosted – output.[43]

2.4 | Technological bias

Technology is a powerful agent for change, often radical and disruptive. It offers new solutions, lower costs, greater productivity and creates new markets. Over a century, new technologies, including inorganic fertilisers, tractor-drawn machinery and new cultivars of crops, have hugely increased the outputs of farming. Now there are 'breakthroughs in nutrition, genetics, informatics, satellite imaging, remote sensing, meteorology, precision farming and low impact agriculture'. New technology drives

investment by farmers and further economic activity. This makes it attractive to the Government, which spends large sums supporting the science base, not least to drive exports.[44]

Technology's ability to reduce work and cut costs or increase outputs means there is strong pressure to use it. But technology can have downsides. If it causes direct harm, the Government normally steps in. But it can have unintended harmful consequences that can be overlooked, not least because they cause costs to others. Examples in farming include:

- The mobility of nitrate fertiliser granules in rain means high losses of nutrients washed into watercourses as nitrate pollution or lost into the air as nitrous oxide, a powerful GHG.

- Without care, heavier modern machines compact and damage soils, leading to heavy run-off of rain, loss of topsoil, silting of rivers and greater flood risk.

- Smaller businesses may struggle to invest in larger more complex machinery and maintain their efficiency relative to others. Larger farms may be a more lucrative market for developers of machinery. This could mean that appropriate scale and cost-effective technology is not being developed to meet the needs of smaller businesses.[45]

Investment in agri-tech should be balanced by investment … to support farmers in their role as innovators and their application of knowledge, skills and techniques.

It is debatable whether the Government has the capacity to assess all new technologies and their impacts, let alone to develop policy responses; so a timelag is likely between the emergence of new technologies and their regulation. So investment in agri-tech should be balanced by investment in other means of improving the efficiency and productivity of the industry to support farmers in their role as innovators and their application of knowledge, skills and techniques. This could avoid some of the problems and offer benefits. Farmer-led innovation is most likely to be context specific: individuals respond to their land and its challenges with tailored solutions. This matters as there is huge variation in soils and topography across short distances in England.

Some of the most promising potential for increasing productivity may come from techniques such as better monitoring and management of grass to cut feed costs, mob grazing, using nitrogen-fixing legumes such as sainfoin[46], improving animal genetics and bringing back livestock into arable systems. For example, there are promising signs that grazing with sheep can control herbicide-resistant blackgrass and improve soil health. Relatively simple techniques can increase output and reduce expensive inputs, thus boosting efficiency and protecting soil and water quality. Techniques and new technology can happily coexist, but the advantage of some techniques is that they do not require much capital investment. They can, depending on the conditions, be applied widely with less financial risk.

There are several barriers to the uptake of new techniques that warrant further investigation:

- New techniques may make soils more resilient, increase yields but cut inputs. Farmers may earn more but spend less. With less economic multiplier effect, this could dampen growth, making it less attractive to a growth-oriented government. New technologies are promoted by the companies that have developed them, but we currently lack such mechanisms for promoting new techniques. These need to be put in place.

- Farming is a fragmented and varied industry, and the farmer population is ageing, resulting in a workforce that may be less inclined to try new techniques. There is no requirement that farmers engage in life-long training and skills development so it is hard to identify an access point for developing and spreading take-up of new techniques.

- The industry is suspicious of the Government, its bureaucracy and regulation, so this may be a difficult point from which to disseminate new techniques. There is no longer a government agricultural extension service and no simple accessible national scheme to support farmer knowledge and training. Rural development schemes do fund farm business development , but funding is not the same as accessibility.[47] Applications take time and may be competitive, with no guarantee of success. Farmers, especially in smaller operations, may lack the time or energy to apply for training.

2.5 | Lack of policy support for scale mix

A number of major and strategic challenges lie ahead as the Government's own Foresight research showed.[48] Yet, successive governments have not considered what kind of mix of farms we might need other than that delivered through existing imperfect markets tempered with flawed public payments into farming. There is little vision beyond an economic one, and no policy to retain different sizes or types of farms

in different areas. The absence of clear policy has become a de facto policy of delivering restructuring of the industry into larger farms with less mixed farming and local diversity. While we do have direct public payments to underpin farm incomes, it is plain that for decades it has not been enough to save thousands of smaller farms – 34,000 or 14% fewer farms in the UK in the past decade alone – but has merely slowed their disappearance.[49] The Government has resisted limits on the highest payments, and only in the current CAP settlement has it accepted a redistribution of a very modest amount: payments over 150,000 euros have been cut by 5%.[50]

Without a strong vision and different policies, economic pressures are likely to drive farm numbers down further. This could lead to the disappearance of most small farms, with their land merged into larger farms and putting medium-scale farms in increasing peril. Ultimately, the industry could be consolidated into fewer much larger holdings as farms expand to compete in global commodity markets, with smaller farms surviving by serving primarily local or niche markets and adding value. This is the direction food retail has taken. Many fewer businesses now operate, with a core of large national or multi-national chains and a much reduced sector of smaller independent stores. Restructuring of grocery retail over decades has cut traditional stores from nearly 120,00 in 1950 to fewer than 20,000 in the late 2000s.[51] Given that food retail so strongly influences the economics of farming, there's a real risk farming will follow this pattern.

Some economists argue that this restructuring cannot – and should not – be avoided. It is economic progress generated by market forces – as less competitive farms leave the industry, their resources will be reallocated to more efficient ones. The logic of this economic view is that, unless there are limits to efficiency that come with scale, a few very large farms could be the most efficient and productive model.

This raises several questions. Is farming any different from other industries? Are there other reasons policy makers should intervene? How few farms do we want? What threshold of farms is low enough to warrant intervention? If not 200,000, then 100,000 or 10,000 or 1,000? The answers to these questions depend on what kind of countryside we want, what other benefits beyond productivity and efficiency in food production we need to secure, what trade-offs we will accept and how many farms, of what type and size, can deliver this vision. At present, such questions are fudged. They are left to a mixture of the market, and some regulatory constraint via limited land-use planning and environmental impact assessment.

2.6 | Land-use planning

Land-use planning has less to say about farming than might be expected, given the strategic importance of a secure food supply as well as farming's role as the major land user. Farming was largely exempted from the planning controls brought in by the 1947 Town and Country Planning Act, and remains so today.

CASE STUDY MIXED LARGE FARM; SOIL HEALTH; BIODIVERSITY; DIVERSIFICATION

The Cholderton Estate, on the border of Hampshire and Wiltshire

The 1000 hectare Cholderton Estate, managed by Henry Edmunds, has significantly diversified over the past 100 years: the Cholderton and District Water Company, burials in Michael's Wood and hiring out disused farm buildings for light industry provide a range of sources of income. The estate demonstrates that farming and a healthy environment can co-exist. It is widely regarded as an excellent example of sustainable agriculture: having reasonable levels of production whilst balancing wider social and environmental benefits; hosting educational visits, providing jobs for local people and funded via the Countryside Stewardship scheme to restore chalk downland habitats that cover 20% of the site.

The estate is also highly diverse in habitats. It operates a mixed farming, closed system with around 800 beef and dairy cattle and 250 sheep. The estate is organic so purchases no nitrate or agrochemicals. Nutrients originate from animal manure and the amount required per hectare for each field is calculated to avoid unnecessary losses to the environment. Henry has also developed 'The Cholderton Mix' of different grasses and legumes for grazed pasture. It provides wider benefits such as improving animal health and soil nutrient levels and fostering a huge range of different invertebrate species. The seed mix is now sold to other farmers across England. There is a mix of woodland, arable land and areas of brassica crops for livestock and over-wintering birds. Large numbers of trees have and are being planted on the estate to increase bio diversity and help make the farm nearly carbon neutral. The estate employs 22 people on husbandry, forestry, mechanics, building maintenance and general farm and conservation work.

The farm's diversity supports a wide range of fauna including: 450 species of the larger macro moths, 10% of which are considered to be rare; 34 species of butterfly; 70 species of bird including grey partridge, skylark, corn bunting and breeding lapwings. There are excellent populations of harvest mice and brown hares, both species in national decline. The farm is also an important gene bank for the extremely rare Cleveland Bay horse and Hampshire Down sheep. A key driver of the high biodiversity levels is the restoration of the chalk grassland, one of the most threatened habitats in Britain. Working with the RSPB, sustainable management of the land has allowed the downland to thrive, attracting a range of equally rare and vulnerable insects such as the Adonis and chalkhill blue butterflies (classified as near threatened); the Duke of Burgundy fritillary (threatened), the grizzled skipper butterfly (vulnerable) and rare hornet robberflies. The grassland is also home to a plethora of wildflower and grass species. Last year thyme broomrape was found growing in one of the areas of restored downland, a new species for Wiltshire. Fly honeysuckle, new to Hampshire, was discovered in a different area. Hampshire County Council has designated areas of the grassland as a Site of Nature Conservation Importance. As a result of much of this work Henry won the RSPB Telegraph Nature of Farming award in 2012.

Henry says he faced a range of difficulties in developing his successful, sustainable farm. One example is discovering the best ways to encourage the successful breeding of lapwings. This has involved endless patience, time, cost and perseverance.

The thin chalky soils are inherently lacking in fertility and are very vulnerable to erosion and infestations of eel worm, which can be a serious pest of arable crops. Fertility can only be preserved by a mixed farming system where a combination of grazing animals and leguminous crops are used to maintain soil structure. It is by retaining this system that bio-diverse integrity has been achieved. Henry has written (online) "All wildlife benefits from a mixed farming regime, yet this has been discouraged under present support mechanisms....What you will see at Cholderton can be achieved only if farming is profitable... support mechanisms must be geared towards those systems of farming that are most conducive to the preservation of the tapestry of a diverse countryside, in all its many and varied aspects."

Food and farming are not important elements of policy for England as set out in the National Planning Policy Framework (NPPF).[52] This is despite the fact that the food supply chain heavily influences farming and relies on planning decisions and strategies for its infrastructure: packhouses, abattoirs, food processing, distribution depots, stores and markets. Food and farming are broadly seen to be outside the remit of planning and planners. The general exception to this has been policy to protect from development the best and most versatile land for food production, but, even here, the previous rigorous sequential approach has been watered down in the NPPF. This means that a coherent approach to developing a sustainable food chain from field to the home cannot be delivered by local authorities.

Farms and farmed use of land are not usually covered in local plans or local authority strategies as a result of the extensive regime of permitted development rights that applies to agricultural developments. Farmers can erect large agricultural buildings with only limited controls. And, depending on where they are sited, such buildings may not have to be used for farming at all. These rights have been extended recently so that more farm buildings can be converted, particularly into homes.

The relative planning freedom farms enjoy has had several notable effects:

- Growth in scale of farm sites has been largely uncontrolled, and some livestock farms have expanded beyond the capacity of the landholding to feed the animals or dispose of their waste.[53] This increases traffic and the risk of pollution. Some farmsteads resemble industrial sites with increasingly large functional sheds that are rarely designed or screened to be sensitive to the rural setting.

- Farmsteads can be too easily sold off or converted, and rural homes, particularly farmhouses, can sell at a premium. The loss of smallholdings and merger of farms means entry to the industry and progression for tenants from small to larger farms is becoming harder.

- Under the current system, it is not clear why farming should continue to enjoy the freedoms that other businesses and individuals do not have. This risks undermining trust in the fairness and objectivity of the planning system, which can generate public and community resistance to positive development.

Despite the generally permissive context of development rights, planning policy tends to resist the development of new farms in rural areas because they usually involve new buildings in open countryside, and can grow in an unplanned way or be sold off or converted. This is unfortunate, as some areas could benefit from the promotion of new low-impact and sustainable farms, which could bring variety to the landscape, local jobs and products, opportunities for young or skilled older workers to enter farming, and the involvement of communities. Ultimately, we lack a strategic vision of the number and size of farms we need for a secure food supply and a wider range of social, economic and environmental purposes. We may need to consider greater planning constraints on their change of use and loss in exchange for a more liberal regime of promoting and developing new farms which could contribute positively to the community, prosperity and character of the countryside.

2.7 | A cheap food culture?

Farming has to be viable. Currently, farming sells produce on the open market but generally needs public financial support as well. This public funding will be reviewed and reformed but it will need to continue in the medium term. The market needs to do more now and and still more in the future to support and create a successful resilient farming sector that sustainably manages natural resources and delivers the other benefits we need from it. In part, this can be achieved by helping the industry to become more dynamic and innovative so that it can compete better in the future. However, the 'market' – influenced by food processing, service and retail businesses, the public sector and the public – has developed over recent decades in ways that could present barriers to this, including:

- Food retail has transformed via supermarket expansion into a tough, highly competitive market that has driven food prices down. Low prices appeal to the public. The average family's weekly food spend has fallen each decade to just over 9% of weekly income in 2013. Compared with other EU countries, UK citizens spend the least on food, after Luxembourg.[54]

- Cheap food is argued for as a social necessity. The 2008 financial crash and recession sparked an increase in food poverty. Those on the lowest incomes spend up to twice as much on food as a percentage of income as the highest earners. Food prices increased by more than 40% between 2005 and 2014, but since 2015 have started falling.[55, 56]

- Our food culture has altered dramatically, opening up to world cuisines and a choice of foods unavailable and unimagined a generation ago, and our expectations of what we can buy and eat have also changed.

- There are more supermarkets but far fewer independent and specialist stores such as butchers, bakers, greengrocers and fishmongers. Such stores were locally connected, and often sold a high percentage of locally sourced produce.[57] Their loss and that of associated businesses such as wholesalers makes it harder for smaller farms to find a market.

- Big grocers now dominate retail, and farmers and growers, particularly larger ones, have little choice about where to sell the volumes of food they produce. So supermarket buyers have a powerful advantage in negotiations, pushing down prices paid to farmers and asking them to carry the risk of promotions and unsold produce. Returns to farmers have become leaner, in some cases leaving them struggling to cover costs, let alone earn a fair income.

These trends have emerged in the absence of policy or in spite of it. Retail planning policy to support town centres since the 1980s has largely failed to check supermarket expansion on sites that favour the business models of a few large businesses. Regulation of the supply chain through the Groceries Chain Adjudicator has been slow to emerge and does not address businesses at more than one remove from the large grocery chains. Successive governments have failed to intervene with a food policy to tackle poor nutrition, food poverty, rising obesity or the cost to the nation's health or health service. Sensitivity to charges of being a 'nanny state' is another barrier. As a result, the notion that food should be cheap to feed the poorest has been embedded, but no one asks why millions of food workers and farmers should be impoverished as a consequence. The buck has been passed back to us as consumers, although the messages we receive on food are confusing and the levels of information we have are poor.

The clear labelling we need to make informed choices is absent, despite the fine work of Fairtrade, LEAF and the Soil Association.[58] There is confusion over country of origin, precise ingredients, use-by, sell-by and best-before dates. The misuse of tags such as 'farmers' market' or 'farm fresh' does not help. There is a lack of standardisation of labelling and information on sustainability of products is poor. Parts of the food industry should be praised for strategically addressing sustainability throughout their businesses, and this has driven change in their supply chains. But if we want the market to play its part in delivering a sustainable, secure and resilient farming sector through the supply chain, we need a clear vision and strong leadership from the Government.

Moving to more dynamic, resilient farming

There is much evidence to show that farming is struggling financially, broadly failing to address key environmental challenges, and that the public are increasingly disconnected from farming and food production.

To ensure its survival, farming needs to become more innovative, more resilient and to be more effectively rewarded for key public benefits. A more diverse industry would help achieve this: diverse in what it produces, in who farms the land and the approaches they take. Yet Government policy is driving agriculture towards increased specialisation and homogeneity. This is a high-risk approach. In this section we consider areas of policy, and changes that could address the barriers identified above.

3.1 | Redirecting public funding

Most funding for farming has come from the CAP and is tied to complex state intervention, with rules on crop growing, management of land, habitats and landscape features. Leaving the EU is an opportunity for farming policy to be more flexible and better tailored to national conditions. Reform might also be swifter.

Public funding of farming needs to be repurposed to address the key social, economic and environmental challenges of farming, and to better support the breadth of public goods we need farming in England to provide. Policy change should take into account the following principles:

- If direct income support remains, it should be progressive to help active farmers most in need rather than those owning the most land.
- The share of total funding for public benefits needs to be big enough to motivate a high percentage of farmers to commit to long-term good management across all types of landscapes.
- Funding structures need to be simple and work in ways that foster collaboration with farmers and overcome resistance to the forms of state intervention that inevitably come with them.
- 'Perverse subsidies' need to be removed so that farmers are not funded both to farm in ways that undermine environmental outcomes and to restore the damage.
- Public funding for farming needs to be explainable and more accountable to the public who pay for it.

New approaches should also be explored, including:

- Funding support for widespread adoption of agro-ecological practices such as minimum tillage, cover crops, green manures and agroforestry (currently excluded from support in England).
- Banding direct payments so that they taper as farms increase in scale (and can harness greater economies by their size).
- Targeting payments to help new horticulture to boost sustainable fruit and vegetable production, where the UK has a recognised national shortfall.
- Bringing new blood into farming and speeding succession to a new generation by helping farmers to retire by providing them with a long-term income; this could be done by diverting direct payments into pension contributions or other schemes proposed, such as bonds.[59]
- Making cost-effective payments to smallholdings (those below five hectares are currently excluded) by developing ways to lump together payments or make multiple year applications to reduce costs to government and business.

3.2 | Opening up land to new farmers and growers

Land is a conservative asset often long held for historical and social reasons. In recent years, ownership has concentrated further and the cost of land has risen. These factors make it difficult for people outside the industry to find land to buy or rent to start a new business producing food. Making land more available to new groups could bring innovation, dynamism and entrepreneurism into the industry. This could rejuvenate the sector, allowing new businesses to take on underused parcels of land (publicly or privately owned) and make it more productive. Small areas of land would lend themselves best to horticulture and fruit farms – a sector that needs development and benefits at small scale from proximity to local markets. This gives scope for new community-supported agriculture that would link local people to farming and growing.

Government policy seems to have favoured restructuring of the sector so that smallholdings disappear, and we need a real change of policy emphasis to promote making land available for new smallholdings and to support the re-emergence of smaller farms. To make this happen, the Government should consider a range of policy options:[60]

- Put in place an accessible, comprehensive and transparent register of land holdings for the whole of England, and include any beneficial ownership by overseas investors. This would enable unused or underused land to be identified and owners contacted, and help local authorities to create proper registers of their assets, giving local people the information to identify opportunities to make more land available for allotments and smallholdings or other areas to grow food.
- Establish a new community right to bid for farmland near to communities that comes onto the open market and give communities the time to raise funds. A package of support might be needed to raise adequate funds, such as setting up a national community assets fund, some form of tax break to social investors or tax exemptions to landowners selling to community groups.
- Review fiscal and other incentives to encourage the release of small parts of large landholdings (perhaps 1% of holdings of 1,000 hectares or more) and provide new affordable smallholdings near existing settlements. This should be under some form of community land trust or other structure to offer protection from sale for non-agricultural use, or a long lease to enable reversion to the existing owner if the land ceases to be farmed.
- Develop a vision, strategy and policies to prevent or discourage further sell-offs of the county farm estate and to reinvigorate their purpose as incubator farms for new entrants. This might include encouraging tenants to move into the private sector after a sufficient lease period to establish their farming business (perhaps 10 years); division of suitable sites into micro-units with new homes to support new horticulture and on-site processing; long leases with rent-buy arrangements to enable new farmers to buy their holding and release funds for councils to buy more farms for the estate.

This vision might initially be threatening to those with large landholdings. But if done with care, it need not infringe property rights. If done well, it could build support from communities and new connections with them, and open up new land to more diverse cropping locally. It could enable a new generation to enter farming affordably and offer the prospect of dynamic and creative new farmers and growers joining the sector.

3.3 | Changing the measures of success

The economics of farming matter and the industry needs to be viable. Measures of success that omit key cost factors or assets do not give the full picture. Business as usual or 'largely as usual' farming that is producing more but over time destroying its own assets – the land and soil – is not economic progress and leaves the industry less able to cope with challenges such as climate change. We need to develop measures that take account of the whole picture and feed into better policy making and farm practice. If this is to happen, the Government must:

- Address the failings of GDP as a measure of national economic progress and work to improve national reporting of economic growth including, where possible, the way it is presented by policy makers to the public.

- Make a strategic plan for food and farming highly ambitious in how it assesses farming's performance over a 25-year cycle. Government should plan for a holistic assessment model that accounts for all major inputs and outputs on farmed land. This should build on learning in relation to natural capital accounting techniques being trialled in Defra's four 'Pioneer' projects. We must explore how to factor in 'hidden inputs' provided free by nature (pollination, rainwater, predation, nutrients) as well as 'hidden outputs' (loss of nutrients to water or air, soil erosion, GHGs). Positive outputs such as soils storing carbon or with greater capacity to absorb and retain water to reduce flood risk must also be measured. The plan should commit to producing a basket of measures

CASE STUDY **SUSTAINABILITY; TRAINING; COMMUNITY VOLUNTEERING; ENTERPRISE**

Forty Hall Farm, Enfield, north London

Forty Hall is a 70 hectare farm owned and run by Capel Manor College. It sits within the Green Belt in the borough of Enfield. The farm aims to be at the heart of the community as 'a teaching resource, food producer and as a place where people come together to grow, eat and celebrate good food'.

The organic farm has a community vineyard (which produced its first harvest in 2013), an orchard with 130 fruit trees, a nine acre market garden business growing vegetables and salad, and commercially-farmed livestock. The farm is also part of a Higher Level Stewardship agreement that supports the low-input management of three species-rich hay meadows and restoration of hedgerows and historic buildings.

The farm is home to a range of farm animals, including Red Poll cattle, a mixed sheep flock including 60 breeding ewes and Lincoln Longwool and Jacobs rare breeds, and a small group of pigs with Saddleback crosses and Large Blacks. Meat, fruit and veg and other produce is sold through the farm shop and other local shops, and the market garden also supplies a vegetable bag scheme – Enfield Veg Co – and sells vegetables wholesale.

Students and volunteers are integral to the work of the Farm, which provides routes back into training and education through Capel Manor. Many of the courses at Capel Manor involve practical sessions at the farm, which also offers short courses in traditional skills such as hedge-laying and scything. It has received support from a range of funders, including the Greater London Assembly, for its training, employment and community work. The farm also hosts a range of community events and festivals, including the Enfield Food Festival, an annual Apple Fair, and a popular monthly music night.

to guide policy making and against which the industry is regularly assessed. This would enable targeting of financial and other support, and inform better on-farm monitoring, measuring and decision making. Ultimately, it would help assess the effectiveness of public funding streams in securing positive change on farms.

- Work collaboratively with the industry and experts such as agronomists, environmental scientists and accountants to develop measures and on-farm monitoring that are practical, functional and affordable in time and money and can support benchmarking of performance on costs, yield and management of natural assets and resources. This needs to drive sharing of good practice and better farmer understanding of how to sustainably boost performance. Accounting and financial analysis methods may need to change at farm level and above to better reflect aspects such as loss of soil value via depletion, and the costs of nutrient waste both for the farm and as pollution for water companies to clean up.

These changes could herald a smarter way of measuring the more diverse outputs of land management (carbon storage, water retention or landscape character, for example) and help assess the likely trade-offs. This will better indicate where the real improvements in farming performance lie.

3.4 | Promoting better techniques and technologies

Government plays a vital role in funding research and development (R&D) through research institutions, facilitating in-field testing and the use on farms of appropriate technologies.[61] It can also ensure technology development does not exclude small to medium-sized farms, for example by supporting the development of 'compensatory' technologies.

CASE STUDY **AFFORDABILITY; ACCESSIBILITY; PLANNING; SMALL-SCALE**

Ecological Land Co-operative

The Ecological Land Co-operative (ELC) is a community benefit society that aims to provide affordable, ecological, residential small landholdings on marginal agricultural land for new entrants into farming. It is, according to Zoe Wangler, executive director, the only organisation in England that does this. It aims to purchase land for 20 smallholdings by 2020.

Zoe describes the process to keep these smallholdings affordable in perpetuity: "We sell our smallholders a 150-year lease but allow them to pay over a 25-year period in rent payments, rather like a hire purchase. This provides the smallholder with affordable access to land and security of tenure. It also provides us with a mechanism to release our capital over 25 years which can be used to provide a further smallholding for a new entrant."

The ELC addresses one of the key issues for new residential smallholdings – getting planning permission. ELC successfully obtained temporary planning permission for three smallholdings, including the development of three low-impact dwellings and a barn on 9 hectares of greenfield land at Greenham Reach, Devon, in 2013.

It has been a challenge to get local authorities to understand and appreciate the value of small-scale, mixed agro-ecological farms to a healthy, vibrant rural economy. There was significant local opposition to the proposal because of the new buildings at the site and the expected increase in traffic. The original planning application was refused despite a recommendation for approval from the planning inspector. Following an appeal, the project was granted temporary planning permission for five years. ELC hopes to apply for permanent planning permission on the basis that it will have demonstrated the sustainability of the project.

A number of conditions have been imposed such as putting in a layby. Delay in getting planning permission has had knock on effects in securing new tenants. This means that the project has even less time to prove it is economically sustainable.

Such problems increase the costs of a project as well as the hassle. But the project also provides a chance for independent businesses to work together and share ideas.

Despite the obstacles, all three holdings are now occupied, with the farms focusing on a range of produce, including herbs and medicines, salad and vegetables, and goats and chickens. They have also won increased local support by hosting regular visits from local schools and the community, and running a veg box scheme. The ELC is connected to similar schemes across the world, many of them hosting WWOOFers – volunteers who are part of the World Wide Opportunities on Organic Farms.

The ELC completed the purchase of a second site, in Sussex, in June 2016 and hopes to obtain planning permission in early 2017. It will then start the search for new entrants to manage the smallholdings there.

Government should use its agri-tech initiatives to aid the development of technologies affordable for small to medium-sized farms. For example, robotic weeders could be used on all scales of farms if they can be produced at low-enough cost. This would enable small-scale horticulture to cut costs and workload and, because of the technology's small size and low weight, all but eliminate soil compaction problems. The aim should be to support all farmers, especially the least efficient, with low-cost solutions to improve performance.

The introduction of new technologies needs to be balanced with investment in improving the knowledge base, skills and techniques used by farmers across the sector. Government should put in place the architecture and structures to develop new techniques in farming, assess them and subsequently encourage rapid and wide take-up of good practice.

If we want to improve access for a greater diversity of people and help progression through the industry, we need to maintain access to a range of farm sizes.

In this respect, the Government should use some of its – still substantial – resources to work with industry bodies to ensure the mechanisms that already enable farmers to develop and disseminate innovative approaches are taken up more widely. Ideally, this would be built on a collaborative model, with expert support but led by practitioners, and substantially owned by farmers or growers, who could adapt techniques to local conditions. Some important initiatives are already taking this forward, such as the Soil Association's farmer field schools,[62] part of the Innovative Farmers scheme.

3.5 | Challenging growth in scale

The continued loss of smaller farms is a threat to the diverse size structure of farming.[63] If we want to improve access for a greater diversity of people and help progression through the industry, we need to maintain access to a range of farm sizes. This issue has had little overt support from the Government or the main farming bodies.[64] Yet, could the comparative lack of dynamism in farming be linked to the difficulties encountered by new entrants, or the ageing population, or the increasing consolidation of the national farm estate?

At the heart of this question is whether we wish to see farming concentrated on fewer larger holdings or dispersed across a range of farms. This is a contentious area for policy intervention because it might mean constraint on farm expansion even if the principal aim is to enable new blood into the industry. Government intervention is likely to provoke fierce opposition from farming bodies, yet tighter regulation could be traded for greater liberalisation elsewhere or a commitment to enable markets to work better for farming. To build consensus, the Government should set up a policy commission with wide representation to explore the options and make recommendations. The commission should consider the following:

- Stronger controls to prevent loss of smallholdings as working farms, such as new change-of-use conditions for small farmsteads.
- Tax or other fiscal measures to discourage the loss of farms from agriculture or tax exemptions for those who purchase a holding to keep it in agriculture. Farmsteads could attract high levels of stamp duty where they are bought and split up rather than farmed.
- Limits on who is sold agricultural land within an area, with preference given to local tenant farmers or new entrants. This could help prevent land being bought primarily for investment or tax reasons. This model is used in France, where regional agencies intervene in the sale of local rural land.[65]
- Investigate mechanisms – including through the planning system – that could enable the Government to maintain a diversity of farms in rural areas. This could involve powers to set thresholds on farm expansion, to control the concentration of activities on one site (particularly industrial-type activities not closely related to the land itself) or to sequentially test for impacts on other farms in the area, the local economy and the wider environment, and propose alternative sites. These issues are currently devolved to various bodies, including planning authorities and the Environment Agency. A review should consider the interaction of different policy areas and remits, and establish where there are conflicts and scope for greater clarity.

3.6 | Better land-use planning for sustainable farming

Farming is strongly influenced by the nature of the wider food supply chain (food processing, distribution, retail and catering). The infrastructure on which the supply chain depends is subject to planning management and control. Planning could promote a more sustainable food supply chain as part of wider sustainable development, but this role is poorly acknowledged in national planning policy. Farming is the major land user and is critical to national and natural health and wealth. National policies should have more to say on how planning could help to deliver a more sustainable food system. Government should revise the NPPF to:

- Recognise the centrality of farming, farmland and food production to economic, social and environmental sustainability, in particular by considering agricultural land positively as part of economic productivity, rather than viewing its protection negatively as a constraint on development.

- Bring together the related needs of farms, farm infrastructure, food processing, distribution and retail.

- Support on-farm development that is linked to farms' primary produce and enables them to add value to their production, and diversify into processing and the supply of produce directly or through short supply chains.

- Properly define what sustainable development means with respect to low-impact farming and use this to promote high standards for new on-farm development.

- Protect the highest quality land as a strategic asset and not permit it to be permanently developed unless carefully defined exceptional circumstances apply.[66]

The NPPF should enable local authorities to:

- Plan to maintain a mix of farms in their area with a diversity of scales and production types.

- Promote new smallholdings to help new entrants to farming and progression.

- Diversify local food growing and processing to support the local economy and supply local markets with fresh produce such as fruit and vegetables.

- Increase public access and connection to farming.

The local population and businesses need to be confident of the fairness of local planning processes and decisions. This could mean that local authorities implement tight controls on new farm smallholdings in relatively sensitive rural areas as well as on other farm development to avoid abuse and to maintain trust in the planning system. It also means local planners should have access to the resources and expertise to do this effectively.

Broadly, new planning policy at national level and translated into local plans should enable local authorities to:

- Identify need and plan for new smallholdings in their area, including affordable holdings to broaden access.

- Include conditions that new smallholdings are farmed in perpetuity, and that, if they fail to do so, require that buildings are removed. Buildings should be low impact (to be carefully defined, for example, as zero or near-zero carbon, using renewable and recyclable materials, and removable without extensive groundworks).

- Use new smallholdings to offer wider public benefits such as a supply of fresh fruit and vegetables into local markets, new public access routes or forms of connection via community engagement.

- Secure land for food growing and production via development consent in local or neighbourhood plans. This could create new allotment sites, and – as stepping stones for new growers and farmers – new community right-to-grow plots of one or more hectares.

3.7 | Moving from low prices to high values

Weak regulation and the loss of diversity in food retail have led to a race to the bottom on food prices. This has undoubtedly damaged the finances of farming and continues to threaten its viability. The absence of a coherent policy on food has enabled a cheap food 'policy' to evolve by default. Low prices help some of the poorest to eat but not necessarily to eat well. This policy inactivity has also contributed to rising levels of obesity and avoidable disease such as type 2 diabetes and malnutrition. If UK producers are imperilled, so too is our natural capital. Worse still, we export these impacts to countries from which we import food around 40% of our needs[67] – and feed for livestock. These market failures cannot be addressed by public funding of farming alone. We need policy leadership to deliver a market that functions better for farming as well as delivering fair, affordable produce for the public. People are used to low prices, and to promote and embed other values will take time and effort. In the long term, the affordability of food is interconnected with security of supply and a sustainable and resilient farming sector. First, the Government will need to overcome its unwillingness to act on food policy. The tax on sugary drinks proposed in the 2016 budget indicates this can be done. To drive change, the Government should:

- Promote multi-purpose farming through development of new standardised, simple sustainability labelling to give the public the information to make better choices. This should go beyond carbon emissions alone, and wrap a basket of measures of sustainable management of natural resources and equitable trade into a single grading that can be easily communicated to the public.

- Work with the retail industry at all scales to adopt sustainability labelling and to ensure sustainability is improved by choice editing through the supply chain. There should be a culture of long-term relationships and fair trading.

- Promote diversity and competitiveness in food retail and greater choice for the public by supporting the development of new models of retail that are underpinned by values such as local distinctiveness, provenance, freshness, fair trade and connection between producers and the public.

- Ensure all food retailers – internet and 'bricks and mortar' – operate on a level playing field in terms of business rates and taxation.

A new vision for farming

Farming is heading in the wrong direction. As part of the larger food system, it is failing to deliver good public health, efficient use of natural resources, or the countryside and natural environment we need for our long-term future.

A decades-long focus on increasing production has left fewer farms and farmers, a damaged environment and a depleted countryside. Farming has industrialised by moving away from mixed farming, becoming more reliant on agri-chemicals, fossil fuel energy and larger machines. But it is also more detached from rural life, less connected to the public it feeds, and less convincingly a steward of the countryside and natural resources we value.

Despite its efforts to increase output and be more productive and efficient, the gains farming has made have been whittled away by a fiercely competitive retail market. This has delivered cheaper food, but at the cost of falling prices at the farm gate and lower farmer incomes. In spite of generous public funding, much of the industry remains in the economic doldrums and many farmers are in financial peril. At this difficult juncture, the exposure of farming to climate change is becoming more apparent. Agriculture is one of the sectors most affected by changes to the climate and extreme weather. To reduce its own impact, and to adapt and thrive as the climate changes, farming will have to be more dynamic, resilient and innovative than ever. The uncertainty that a changing climate will present in a context of uncertain trading and market volatility suggests farmers will have to cut costs and reduce risks. It is clear something needs to change if farming is to be viable in the long term.

Change cannot be left to the industry itself, the supply chain or shoppers. Farming is central to our food security, countryside and natural environment and it needs the Government's support.

Change cannot be left to the industry itself, the supply chain or shoppers. Farming is central to our food security, countryside and natural environment and it needs the Government's support. The referendum decision to leave the EU presents an unprecedented opportunity to recast national policy on farming and to get the industry back on track and fit for an uncertain future. The Government must show leadership by setting out a new vision for farming that goes beyond short-term economic priorities – with a policy agenda to match. Farming has multiple purposes and it must be challenged to aim beyond food production. The Government should develop a clear vision for what farming needs to achieve to bring together its economic, social and environmental purposes. This will involve reducing damaging impacts, identifying win-wins and necessary trade-offs, and rebuilding natural capital by restoring nature.

The Government needs to take farming policy in a different direction. Policies are needed to promote a more diverse farming system. This means more new farmers from diverse backgrounds helping to regenerate the workforce and build connections in communities. It means new chances to grow a business on the land with stepping stones in place to ease expansion. It means more farm diversity in management of the land to vary production, reduce market risk and build the health and resilience of the soil. This, we suggest, would help regenerate farming. It would lead to a better resourced, more innovative and resilient industry in better balance with restored nature. It would create a countryside that is healthier, wealthier and more beautiful still.

References

1 The gross added value for the whole agri-food sector – including agriculture, food and drink manufacturing, wholesale, retail and catering industries – was £109 billion in 2015. See Defra *Food statistics pocketbook 2015 in year update*, 2016 pp6-7 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/526395/foodpocketbook-2015update-26may16.pdf

2 Domestic-type food production makes up some 73% of the food we need that can be produced in this country (unlike, for example, bananas).

3 'Three EU schemes known as PDO (protected designation of origin), PGI (protected geographical indication) and TSG (traditional speciality guaranteed) promote and protect names of quality agricultural products and foodstuffs'; see http://ec.europa.eu/agriculture/quality/schemes/index_en.htm; the European Commission has also supported local farming, short supply chains and direct sales – see http://ec.europa.eu/agriculture/quality/local-farming-direct-sales/index_en.htm – but the English Rural Development Programme has not taken up some of these opportunities to help small-scale producers.

4 See Defra, *Food statistics pocketbook 2015 in year update*, 2016: the trade deficit on food in 2015 was £20.5 billion with imports £38.5 bn and imports £18.5bn page 8; the fruit and vegetables category has the largest trade deficit: in 2014 imports cost £8.7 bn while exports were £0.9 bn, giving a trade gap of £7.8 bn, page 27.

5 Statistics on average farm business income show that in 2014/15 the only farm types earning net income from agriculture were dairy, specialist pigs and poultry and horticulture. Farms producing cereals and other general crops, grazing livestock or mixed farms all relied on subsidy for over 90 up to 166% of their farm business income on average. While these are averages only, Defra also reports that "In 2014, 60 per cent of cereal farms failed to make a positive income from farming activities." https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/471952/fbs-businessincome-statsnotice-29oct15.pdf Defra, *Farm Business Income by type of farm in England, 2014/15*, 29 October 2015 see p2 and annex Table 2.

6 See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/430411/auk-2014-28may15a.pdf Defra et al., *Agriculture in the United Kingdom 2014*, table 6.2 p38: farmers' share of the value of a basket of food items has gone down on average 15% (from 1988 to 2014) but with steeper falls for lamb, beef, potatoes, apples, tomatoes and wheat for example (-20%, -26%, -30%, -39%, -43% and -43% respectively).

7 After years of campaigning by NGOs, and two Competition Commission inquiries, a Groceries Chain Adjudicator was finally established in 2013 with powers to respond to complaints by suppliers to 11 major supermarkets; s/he was only given powers to set fines in January 2015 (https://www.gov.uk/government/news/fines-for-supermarkets-move-a-step-closer) and cannot address complaints by producers and suppliers back through the supply chain.

8 The UK trade gap between exports and imports of food alone was some £20.5 billion in 2015; see Defra, 2016 op cit.

9 Historic trends show an increase in total farm numbers from 1851 (215,615) to 1925 (330,425) then slow decline to 1951 (296,332) then a rapid fall to 1983 (185,993); the percentage of small farms (5-100 acres) falls from 73.9% to 59.6% from 1951 to 1983; over the same period the percentage of large farms triples from 4.3% to 13.7% (figures for England and Wales for area and number of holdings over 5 acres) p185 table 2 in Grigg D., 'Farm Size in England and Wales from Early Victorian Times to the Present', 179-189, *Agricultural History*, 1983, University of California Press; http://www.bahs.org.uk/AGHR/ARTICLES/35n2a6.pdf
Recent Government data records since 2011 record commercial holdings only for England so direct comparison with figures above is difficult. Data shows a continued decline in the number of farm holdings for the UK from 2005 to 2015 from 248,000 in 2005 to 214,000 in 2015. Over that period farms under under 20 ha have fallen from 120,000 to 98,000; from under 100 ha (including below 20ha) from 206,000 to 173,000 and farms of 100ha and over from up from 12,099 to 12,779. Average area of holdings above 20ha has gone up from 128ha in 2005 to 142 ha in 2015; data from Defra et al., *Agriculture in the UK 2011*, 2012, p18-19 tables 3.3 and 3.4 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82818/defra-stats-foodfarm-crosscutting-auk-auk2011-120709.pdf
and Defra et al., *Agriculture in the UK 2015*, 2016 p7 tables 2.3 and 2.4 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/535996/AUK-2015-07jul16.pdf
For herd sizes for specialist dairy farms in England from 2011 to 2014 these increased from 148 to 172 cows or by 16% in 3 years, see Defra, *Farm Accounts in England – Results from the Farm Business Survey 2014/15, 10 December 2015*, Table B page 11 of https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/483835/fbs-farmaccountsengland-10dec15.pdf

10 Robinson, R.A. and W.J. Sutherland, 'Post-war changes in arable farming and biodiversity in Great Britain', *Journal of Applied Ecology* Issue 1, pp157-176, February 2002.

11 Defra, *Basic Horticultural Statistics* 2014, July 2015 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341921/hort-report-07aug14.pdf

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14 Only a third of UK rivers were classed on Water Framework Directive assessments as of good or high biological quality in 2012 and around two fifths were assessed as poor or bad. Defra, *Sustainable Development Indicators 2013*, 2013, p91table 32 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223992/0_SDIs_final__2_.pdf

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17 GHG emissions from farming have been cut by 16% since 1990 but this is less than half of the national fall across industry of an average 35% and falls of 73% in waste management, 41% in energy supply and 23% in business; DECC, *2014 UK Greenhouse Gas Emissions*, 2014 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/496946/2014_Final_Emissions_Statistical_Summary_Infographic.pdf
On 30 June 2016 the government announced it would accept recommendations from the Committee on Climate Change for the 5th carbon budget which sets a target 1,765MtCO2e by 2030 (equivalent to a 57% reduction against 1990 baseline) https://www.gov.uk/guidance/carbon-budgets#setting-of-the-fifth-carbon-budget-2028-2032

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20 According to WRAP data food and drink waste for the UK was 15 million tonnes across the food chain in 2013 of 41 mt food purchased each year or around one third of the food purchased. WRAP, *Handy Facts and Figures on Waste in the UK 2015,* cited in Defra op cit 2016 p36.

21 Defra, 2016, p37.

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23 Defra *Farm Business Surveys* from 2000/1 to 2014/15 show that mixed farm business numbers (not holdings) went from 8,499 (of 75,458 farm businesses in total in June 2000 Census) to 6,260 (of 57,541 farm businesses in total in June 2014 survey).

24 From 2005 to 2011 farms grew on average by 11% – see footnote 9.

25 Also, not an aspect often mentioned, but the people that do, especially those picking fruit and vegetables, may be seasonal migrants with few connections with local communities or opportunities to build such links.

26 The total labour force involved in commercial farming including farmers, spouses, employees and casual workers was 476,000 in 2015, Defra, *Agriculture in the UK 2015*, 2016 p8, table 2.5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/535996/AUK-2015-07jul16.pdf

27 Figure cited in Lang, T. and M. Heasman, *Food Wars*, 2015, p270.

28 An Oxford University study for the UK Government in 2003 of flows of CAP subsidy showed that 'grain barons' in six eastern counties received more than one quarter of UK CAP receipts: some £540 million of £2 billion total; cited in Lang and Heasman, 2015, p270.

29 "The Common Agricultural Policy is a classic example in an EU and UK context. Every year a little under £3bn is spent on subsidies. These subsidies indirectly incentivise production. At the same time, farmers receive environmental payments to help prevent damage to the environment and to protect important wildlife habitats. The two instruments potentially work against one another with the former dwarfing the latter. Realignment of these incentive systems could provide the same income opportunities for farmers while reducing the depletion of natural capital." p59 Natural Capital Committee, *The State of Natural Capital,* Third report to the Economic Affairs Committee, 2015 https://www.cbd.int/financial/values/uk-stateof-naturalcapital.pdf

30 The number of horticultural holdings under 50 hectares fell 40% between 2008 and 2014 alone (from 5,821 to 3,499) with the smallest holdings under 5 ha falling by 60% (from 2,821 to 1,146). Defra, *Structure of the agricultural industry in England and the UK at June*, updated 17 December 2015. England results by type of farm (Excel spreadsheet): https://www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june

31 See http://farmsubsidy.openspending.org/ -search under UK recipients (all years).

32 See Defra, *Agriculture in the UK 2015*, 2016, p63 table 10.2.

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35 See Hetherington,P., 2015.

36 See Hetherington,P., 2015, p56.

37 The Government (David Gauke, Financial Secretary to the Treasury announced on 19th April 2016 in Parliament that it would be bringing in a register of 'the beneficial ownership of property or structures in this country' for the first time, though details of this aren't yet clear. See Treasury Questions at: https://hansard.parliament.uk/Commons/2016-04-19/debates/16041926000019/TopicalQuestions#contribution-16041926000151

38 Peter Hetherington reports that the county farm estate still covers some 200,000 acres over 50 council areas with 2,000 tenants; (op. cit. p27).

39 See http://www.transitiontownwestkirby.org.uk/files/ttwk_nsalg_survey_2013.pdf; Campbell, M and I. Campbell, *Allotment waiting lists in England 2013*, July 2013: this survey of all English

principal authorities showed a waiting list of 52 people for every 100 plots and a total list of over 78,000 people waiting across 215 authorities (of 323) which had waiting lists. This suggests the total could be at 115,000 or higher.

40 Values have gone up 277% in the ten years to 2014 compared to 41% in the previous decade, Hetherington,P (2015), page 9.

41 Defra, *Towards a one nation economy: A 10-point plan for boosting productivity in rural areas August 2015* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454866/10-point-plan-rural-productivity-pb14335.pdf

42 See Defra, *Total factor productivity dataset* and *Total factor productivity of the UK agricultural industry 2015, 1st estimate statistics notice*, https://www.gov.uk/government/statistics/total-factor-productivity-of-the-agricultural-industry

43 Pretty et al.'s assessment put such 'external' costs of UK farming in 1996 at '£2,343 m (range for 1990–1996: £1,149–3,907m)' or '£208/ha of arable and permanent pasture' in *An assessment of the total external costs of UK agriculture, Agricultural Systems*, Vol.65 issue 2 August 2000 pp113-136.

44 See BIS, Defra and DFID, *UK strategy for agricultural technologies: executive summary*, updated 24 December 2013 https://www.gov.uk/government/publications/uk-agricultural-technologies-strategy/ukagricultural-technologies-strategy-executive-summary

45 Investment in commercial R&D is necessarily geared towards profit; a parallel might be the recognised failure of the pharmaceuticals industry to invest in developing new antibiotics as these cure people who no longer need them, whereas palliative drugs requiring continued purchases generate repeat revenue.

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48 Foresight, 2011, *The Future of Food and farming*, Final Project report, The Government Office for Science.

49 See footnote 9.

50 "Payments over €150,000: If a farmer's BPS payment (excluding greening and any young farmer payment) is over €150,000, RPA will reduce any money above this amount by 5%." See Rural Payments Agency (RPA), *Basic Payment Scheme: rules for 2016*, 2016, p103; BPS refers to the Basic Payment Scheme or direct payment for area farmed https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505559/BPS_2016_scheme_rules_FINAL__DS_.pdf

51 See data for butchers, greengrocers, bakeries and fishmongers from Competition Commission, 2008, cited in CPRE, *From Field to Fork*, 2012, p22; even in 1982 there were 50,000 such stores, http://www.cpre.org.uk/resources/farming-and-food/local-foods/item/2897-from-field-to-fork

52 DCLG, *National Planning Policy Framework*, March 2012 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf; food is cited in paras. 17 and 161; agriculture/al in paras. 28, 89,112 and 143 but for comparison telecommunications is mentioned 11 times and has its own policy section.

53 According to Lymbery and Oakeshott: 'British farm animals produce 80 million tonnes of muck a year' and 'an average-size dairy herd of 100 cows can produce as much effluent as a town of 5,000 people', P. Lymbery and I. Oakeshott, *Farmageddon*, 2014, p172.

54 This average fell from 34% in 1946 to 10.29% in 1997 to 9.28% in 2013; compare this to France or Italy where the average is around 14%; see V. Schoen and T. Lang, *UK Food Prices: cooling or bubbling*, 2014, Food Research Collaboration http://foodresearch.org.uk/wp-content/uploads/2014/07/UK-Food-Prices-FRC-Briefing-Paper-28-07-14.pdf

55 Expenditure on food by gross income decile shows the first and second spending 15.4 and 16.8% respectively but the tenth decile only 8.3% on 2012 ONS data; see Schoen, V. and T. Lang, 2014.

56 For falls in year to June 2015 see Defra, *Food statistics pocketbook 2015*, 2016 p19.

57 See original research in CPRE, *From field to fork: the value England's local food webs*, 2012, which shows such stores carry much higher percentages of local food than the big grocery chains http://www.cpre.org.uk/resources/farming-and-food/local-foods/item/2897-from-field-to-fork

58 LEAF – Linking Environment and Farming – is an accreditation body which promotes sustainable food and farming through the LEAF marque and a detailed farm audit process, http://www.leafuk.org/leaf/home.eb

59 See for example http://centaur.reading.ac.uk/4614/1/The_bond_scheme_-_EU-policy.pdf

60 Land-use planning could also play an important role and is considered in section 3.6.

61 The Government's agricultural technologies (agri-tech) strategy was launched in 2013 with £160 million funding; this has targeted £70 million towards translating scientific research into practice through an Agri-tech Catalyst fund and £90 million through new Centre for Agricultural Innovation; see *UK strategy for agricultural technologies 2013 executive summary* https://www.gov.uk/government/publications/uk-agricultural-technologies-strategy/uk-agricultural-technologies-strategy-executive-summary

62 See https://www.soilassociation.org/farmers-growers/innovative-farming/ : "Innovative Farmers is part of the Duchy Future Farming Programme, funded by the Prince of Wales's Charitable Foundation. The network is backed by a team from LEAF, Innovation for Agriculture, the Organic Research Centre and the Soil Association and is supported by Waitrose."

63 Winter, M. and Lobley, M., *Is there a future for the small family farm in the UK?* Report to The Prince's Countryside Fund, London: Prince's Countryside Fund, June 2016 https://www.farminguk.com/content/knowledge/Is-there-a-future-for-the-small-family-farm-in-the-UK-(4084-2508-419-2671).pdf

64 Principally the National Farmers Union, which has a high profile for comments on farm policy andthe Country Land and Business Association which represents landowners large and small as well as a broader cross-section of rural businesses.

65 Land Management and Rural Establishment Agencies (Sociétés d'Aménagement Foncier et d'Etablissement Rural) are non profit-making private companies under government supervision. They were created in 1960 to intervene on the land market so as to foster balanced, sustainable rural land development." http://www.accesstoland.eu/Unique-land-agencies-the-SAFER

66 This would certainly cover Grade 1 land as currently classified under planning provisions for best and most versatile land; this represents around 2% of all farm land on best estimates, and much of which is or will be threatened by flooding on climate change projections; the agricultural land classification (ALC) system and supporting data are from the 1960s to 1980s and do not account for the potential risk from extreme rainfall or drought that will increase with climate change; a careful review of the ALC system and data is required.

67 In 2014 the UK supplied 54% of our food supply based on 'farm-gate value of unprocessed food'; 22 countries accounted for most of the remainder which was imported; Defra *Food statistics pocketbook 2015 in year update*, 2016 p23 3.1 Origins of food consumed in the UK, 2014. Imports of animal feed were over £2 bn in 2014 (£2,036 bn provisional figure) and included hay, fodder, bran and residues of plants or cereals, Defra et al., *Agriculture in the United Kingdom 2014,* 2015 p78 table 12.1.

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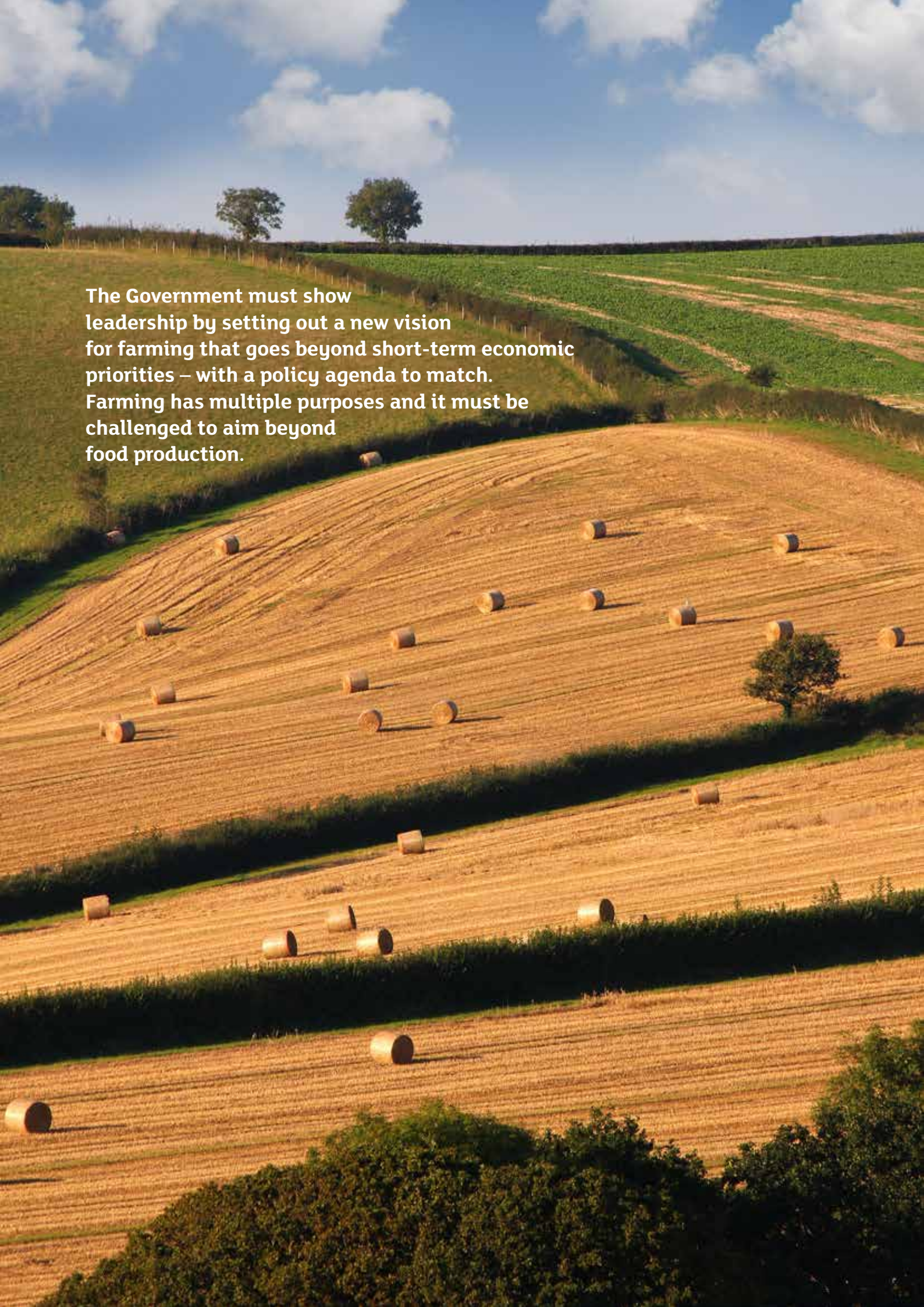

The Government must show leadership by setting out a new vision for farming that goes beyond short-term economic priorities – with a policy agenda to match. Farming has multiple purposes and it must be challenged to aim beyond food production.

CPRE is an environmental charity campaigning for a beautiful and living countryside that everyone can value and enjoy.

We aim to protect and enhance the countryside by supporting policies which:

- Promote the distinctiveness and resilience of the wider landscape
- Foster the growth of local food economies, from field to fork
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